

IN THE CLAIMS

LISTING OF CLAIMS

Following is a listing of all claims in the present application, which listing supersedes all previously presented claims.

1. (Original) An image sensor device, comprising:
a substrate having a photodiode formed therein, and a plurality of transistors formed on the substrate, the photodiode being electrically associated with the transistors;
at least one lower contact formed on source/drain regions and gates of the transistors;
at least one electrical interconnection line formed on the at least one lower contact and being electrically associated with the photodiode;
a light passageway having a light inlet, the light passageway being positioned in alignment with the photodiode;
a color filter positioned over the light inlet of the light passageway; and
a lens positioned over the color filter in alignment with the light passageway,
wherein the at least one electrical interconnection line includes a copper interconnection formation running through a plurality of interlayer dielectric layers in a stacked configuration with a diffusion barrier layer between adjacent interlayer dielectric layers, and a barrier metal layer between the copper interconnection formation and the plurality of interlayer dielectric layers and intervening diffusion barrier layers.
2. (Original) An image sensor device as claimed in claim 1, further comprising a first protection layer covering an uppermost surface of the copper interconnection.

3. (Original) An image sensor device as claimed in claim 2, wherein the first protection layer is formed of at least one selected from the group consisting of SiC, SiN, SiO₂ on SiN, and SiO₂ on SiC.

4. (Original) An image sensor device as claimed in claim 2, further comprising a second protection layer disposed on the first protection layer and an inner surface of the light passageway.

5. (Original) An image sensor device as claimed in claim 4, wherein the second protection layer is formed of a silicon oxide series material.

6. (Original) An image sensor device as claimed in claim 4, wherein the second protection layer has an antireflective property at a bottom of the light passageway.

7. (Original) An image sensor device as claimed in claim 1, wherein the lower contact is formed of one selected from the group consisting of copper, tungsten and titanium.

8. (Original) An image sensor device as claimed in claim 7, wherein when the lower contact is formed of copper, a barrier metal layer is interposed between the lower contact and the first of the plurality of interlayer dielectric layers.

9. (Original) An image sensor device as claimed in claim 1, further comprising an antireflection layer formed on the substrate having the photodiode, the plurality of transistors and the isolation region.

10. (Original) An image sensor device as claimed in claim 1, further comprising an antireflection layer patterned on the photodiode under the light passageway.

11. (Original) An image sensor device as claimed in claim 1, wherein the light passageway is filled with a transparent material.

12. (Original) An image sensor device as claimed in claim 11, wherein the transparent material is a spin-on-glass or a photoresist.

13. (Original) An image sensor device as claimed in claim 1, wherein the lens is a convexly shaped micro lens.

14. (Currently Amended) An image sensor device as claimed in claim 1, further comprising a barrier metal layer on sidewalls of the light passageway.
~~protection layer covering an uppermost surface of the copper interconnection.~~

15. - 33. (Canceled).